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Fall

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[54] **COMBINATION SOLID BEARING AND BALL BEARING SLIDE**

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[52] **U.S. Cl.** ..... **308/3.8**; 308/6 R; 312/348; 312/341 R; 312/350

[58] **Field of Search** ..... 308/3.8, 3.6, 6 R, 6 C; 312/348, 341 R, 343, 333, 344, 345, 346, 349, 350

[56] **References Cited**

U.S. PATENT DOCUMENTS

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3,488,097	1/1970	Fall	308/3.8
3,937,531	2/1976	Hagen et al.	308/3.8

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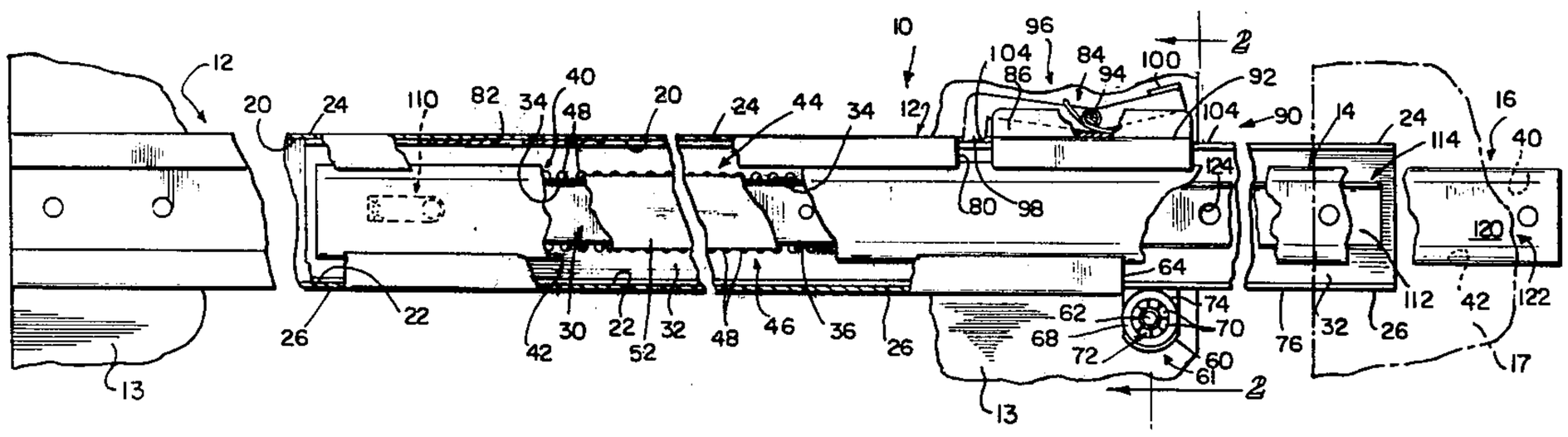
[57] **ABSTRACT**

A drawer slide mechanism for detachably mounting a drawer in a cabinet includes a first slide member for rigidly mounting on the cabinet, a second slide member slidably engaging the first slide member, and a third slide member for rigidly mounting on the drawer. The first slide member provides a pair of facing tracks. The second slide member provides a second pair of tracks in solid bearing engagement with the first tracks. The second slide member further includes a third pair of tracks which face in opposite directions between the tracks of the second pair. The tracks of the third pair form, with a fourth pair of tracks provided on the third slide member, a pair of bearing races for receiving ball- or roller bearings. The fourth tracks face toward one another.

5 Claims, 3 Drawing Figures



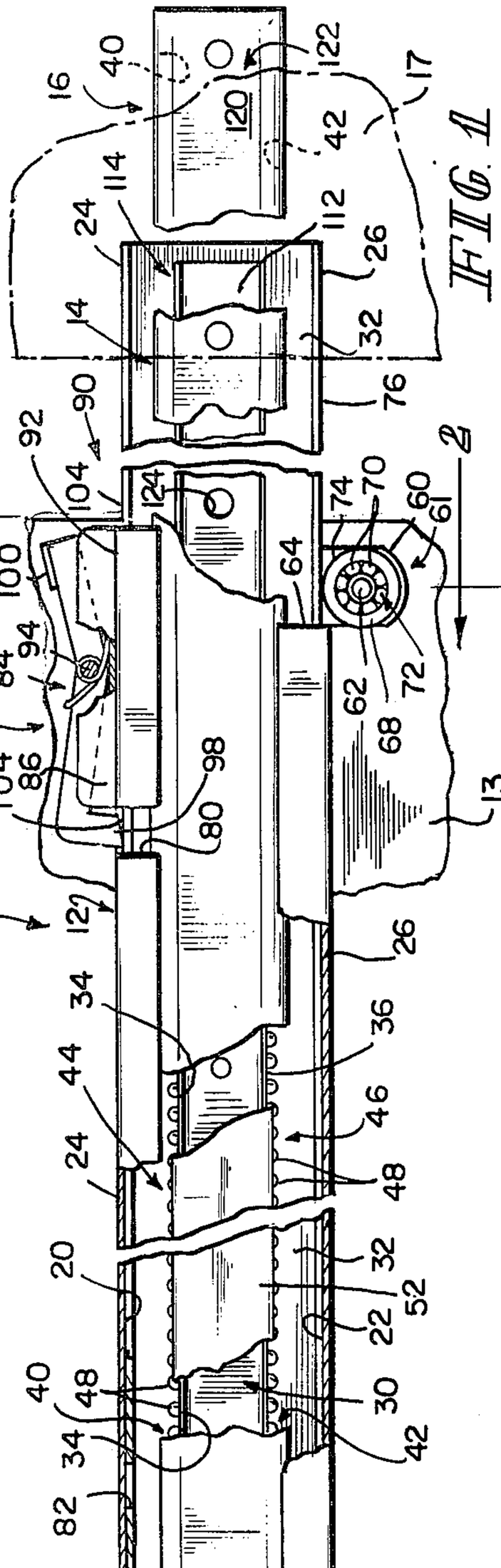


FIG. 1

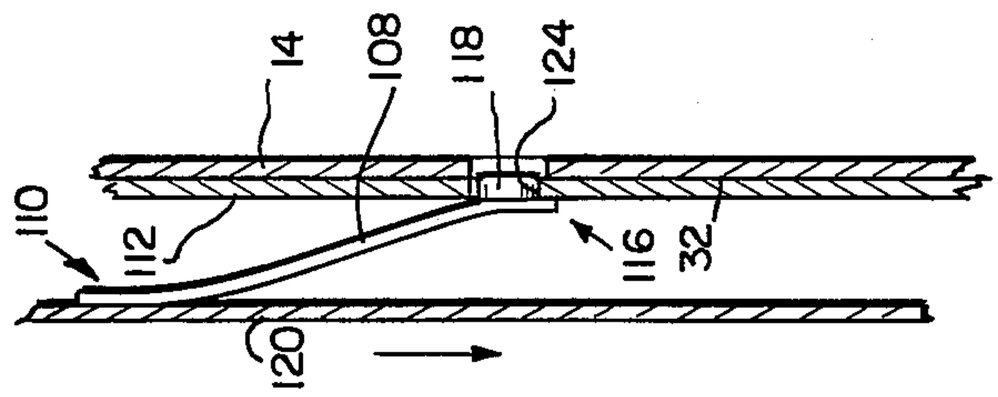


FIG. 3

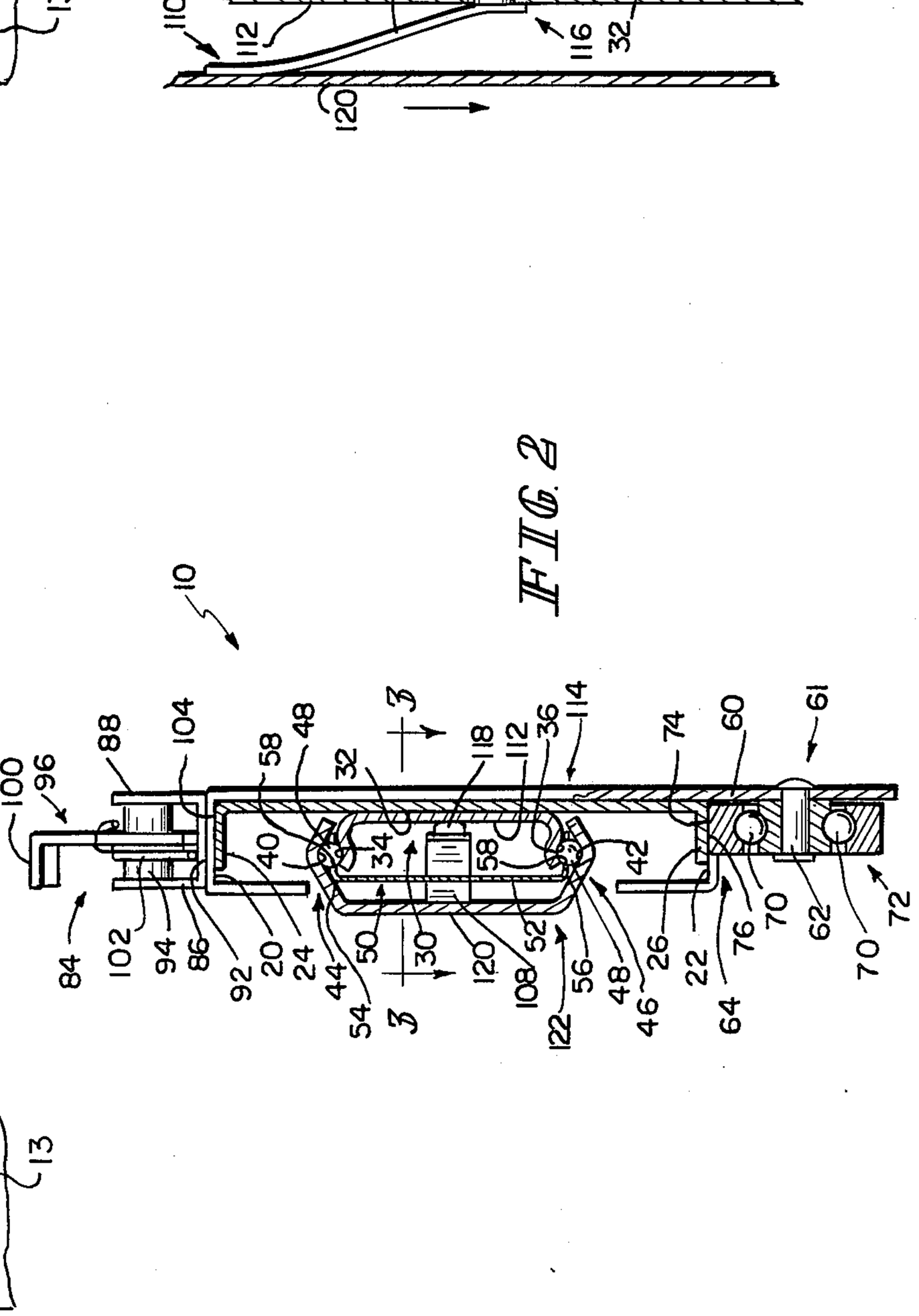


FIG. 2

COMBINATION SOLID BEARING AND BALL BEARING SLIDE

This invention relates to drawer slide hardware and particularly to a drawer slide mechanism which provides a combination solid bearing and ball- or roller bearing slide mechanism, the initial extension of the drawer from a cabinet in which it is mounted being provided by the ball- or roller bearing mechanism to provide initial ease of movement of the drawer with respect to the cabinet. Subsequently, the solid bearing mechanism begins to extend, the solid bearing mechanism providing more friction to brake the movement of the drawer relative to the cabinet in which it is mounted prior to full extension of the drawer from the cabinet.

There are several well-known types of multiple-member slide mechanisms which includes combination solid bearing and ball- or roller bearing movements. See, for example, Hagen et al, U.S. Pat. No. 3,937,531.

It is an object of the present invention to provide a simple combination solid bearing and ball- or roller bearing type of multiple member drawer slide mechanism.

According to the invention, a drawer slide mechanism includes a first means providing a pair of first tracks, second means providing a pair of second tracks engaging the first tracks and a third pair of tracks, and third means providing a fourth pair of tracks. The first, second and third means extend longitudinally of one another, the first and second means being longitudinally slidably connected by engagement of the first and second pairs of tracks and the second and third means being longitudinally slidably connected by a plurality of bearings in races provided by cooperation between each track of the third pair and a respective track of the fourth pair. The first tracks are disposed on the first means in facing relation. The second tracks are disposed on the second means for engagement in respective first tracks. The third tracks are mounted on the second means in nested orientation between the second tracks, and in oppositely facing relation to one another. The fourth tracks are disposed on the third means in facing relation to lie between respective second and third tracks, the tracks of the third and fourth pairs forming with one another the bearing races. Each pair of tracks includes a vertically upper track and a vertically lower track.

In the illustrative embodiment, the first means comprises a first track member for stationarily mounting on the cabinet, the second means comprises a second track member and the third means comprises a third track member for stationarily mounting to a drawer which is extensible outwardly from, and retractable inwardly into, the cabinet.

Further according to the illustrative embodiment, the first track member includes means for bearing weight of the extended second and third track members and drawer. The roller means includes an axle mounted adjacent the lower first track, a plurality of bearing surrounding the axle and a wheel retaining the bearings adjacent the axle and providing a smooth, continuous peripherally radially outwardly facing surface for contacting a downwardly facing surface of the lower second track to prevent the second track member from binding against the first track members as the second track member is projected outwardly to its full extent with respect to the first track member.

Further according to an illustrative embodiment, the first track member includes means providing a disconnect lever adjacent the distal end of the first track member. The disconnect lever includes an engaging portion and the second track member includes means providing a notch for engagement by the engaging portion. The lever illustratively is spring-biased to urge the engaging portion into the notch. The lever is disposed adjacent the upper tracks of the first and second pairs of tracks.

The invention may best be understood by reference to the following description and accompanying drawings which illustrate the invention. In the drawings:

FIG. **1** is a partly fragmentary side elevational view, partly broken away, of a drawer slide mechanism according to the present invention;

FIG. **2** is a sectional view taken generally along section lines **2—2** of FIG. **1**; and

FIG. **3** is a fragmentary sectional view taken generally along section lines **3—3** of FIG. **2**.

A drawer slide mechanism assembly **10** includes a first slide member **12** for stationary attachment to a chest, cabinet or other storage device **13**, shown fragmentarily, a second or intermediate slide member **14**, and a third or outer slide member **16** for stationary attachment to a drawer or equipment **17**, shown fragmentarily and in phantom lines for purposes of clarity, to mount it movably with respect to the cabinet.

First slide member **12** includes longitudinal edges defining a first pair of spaced apart vertically upper and lower facing channels or tracks **20, 22** which slidably engage corresponding upper and lower second tracks **24, 26**, respectively, formed on the opposite longitudinal edges of slide member **14**.

Slide member **14** is also provided with a somewhat C-shaped channel section **30** which is attached to the flat vertical inner surface **32** of slide member **14** by spot welds or other suitable means. Channel section **30** provides a third pair of vertically upper and lower tracks **34, 36**, respectively. Tracks **34, 36** face away from one another toward their respective adjacent second tracks **24, 26**, respectively. Tracks **34, 36** thereby assume a somewhat "nested" orientation between second tracks **24, 26** of slide member **14**.

The third, or outer, slide member **16** provides a pair of spaced apart, facing vertically upper and lower fourth tracks **40, 42** respectively. Tracks **40, 42** lie vertically above and below their respective upper and lower third tracks **34, 36** to provide between tracks **40, 34** an upper bearing race **44** and between tracks **36, 42** a lower bearing race **46**. Bearing races **44, 46** are provided with ball bearings **48** which movably support third slide member **16** longitudinally with respect to second slide member **14**. Bearings **48** in the upper and lower races **44, 46** are held in spaced apart relation to their adjacent bearings by a thin metal bearing plate or "cage" **50** which is somewhat channel-shaped to provide a central vertically extending plate portion **52** from the vertically upper and lower edges of which project a generally horizontal portion **54** and a generally horizontal portion **56**, respectively. Each of portions **54, 56** is provided with a plurality of circular apertures **58** (FIG. **2.**). Upper and lower portions **54, 56** project into the upper and lower bearings races **44, 46**, respectively. Apertures **58** are sized loosely to receive bearings **48** to permit them to roll freely as the third slide member **16** is extended and retracted with respect to the second slide member **14**.

To aid in preventing binding of the solid bearing surfaces provided between first slide member **12** and second slide member **14** by their respective upper tracks **20, 24** and lower tracks **22, 26**, first slide member **12** is provided with a vertically downwardly projecting mounting tag or ear **60**. A bearing assembly **61** including a cylindrical axle **62** projects outwardly from ear **60** beneath lower first track **22** and beyond the outer or distal end **64** of track **22** of slide member **12**. A wheel **68** is mounted on axle **62**, the wheel being supported rotatably on axle **62** by a plurality of ball bearings **70** housed in the race **72** provided between wheel **68** and axle **62**. The radially outwardly facing peripheral surface **74** of wheel **68** is smooth and lies adjacent the outwardly and downwardly facing surface **76** of lower second track **26**. In the final stages of extension of slide member **14** longitudinally outwardly with respect to slide member **12**, surface **76** helps support the load presented on the solid bearing surfaces of tracks **20, 22, 24, 26** by slide members **14, 16** and the drawer (not shown) and minimizes the possibility of binding of slide member **14** against slide member **12**.

As best illustrated in FIG. **1**, the upper first and second tracks **20, 24**, respectively, are provided with vertically facing openings or notches **80, 82**, respectively, which, for one position of slide members **12, 14** are in vertical alignment. This position of slide members **12, 14** in which notches **80, 82** are in vertical alignment occurs at the full extension of slide member **14** with respect to slide member **12**. A generally U-shaped support **84** with opposed vertical walls **86, 88** extends longitudinally of upper track **20** of slide member **12** and is mounted adjacent the distal end **90** thereof. Support **84** is spot-welded or otherwise attached to the vertically upwardly facing outside surface **92** of track **20** to open upwardly. An axle **94** is supported between walls **86, 88**. Axle **94** pivotally supports a lever **96** for movement about axle **94**. Lever **96** includes an engagement end **98** and an actuation end **100**, and is urged by a spring **102** such that engagement end **98** is urged downwardly through notch **80** against the outer, vertically upwardly facing surface **104** of upper second track **24**. When slide member **14** has reached its full projection with respect to slide member **12**, engagement end **98** moves under the urging of spring **102** through opening **82** in upper second track **24** to prevent further movement of slide member **14** in either direction. Lever **96** can be pivoted about axle **94** against spring **102** to disengage end **98** thereof from notch **82** for movement of the drawer back into the cabinet, and also for disengagement of slide member **14** from slide member **12** and disengagement of the drawer from the cabinet.

To prevent excessive movement of slide member **16** with respect to slide member **14** various structures can be provided. For example, one or more of tracks **34, 36, 40, 42** can be provided with a dimple (not shown) which projects into its respective bearing race **44, 46** to prevent movement of bearings **48** past the dimple.

Alternatively, a flexible metal strip **108** can be provided having a proximal end **110** for attachment to the central vertical portion **120** of the generally C-shaped channel **122** providing the upper and lower fourth tracks **40, 42**. The inside surface **112** of channel section **30** is provided with an aperture **124** adjacent its distal end **114**. The distal end **116** of metal strip **108** is provided with a locking buttom **118**. When slide member **16** is projected substantially fully outwardly from slide member **14**, strip **108** urges button **118** into engagement with aperture **124** stopping movement of slide member **16** with respect to slide member **14**. To retract slide member **16** back into slide member **14**, it is necessary to depress button **118** to disengage it from aperture **124** manually.

There is thus provided a combination solid bearing and ball- or roller bearing slide assembly in which movement of the drawer relative to the cabinet initially is relatively easy owing to the low coefficient of friction provided by the ball- or roller bearings in their races. The coefficient of friction increases progressively as the drawer reaches its fully extended position with respect to the cabinet, since, as extension of the assembly **10** continues, slide member **14** will begin to move on the solid bearing surfaces provided between tracks **20, 24** and **22, 26**. The coefficient of friction between tracks **20, 24** and **22, 26** is greater than the coefficient of friction provided by the bearings **48**. Further significant advantages are achieved with the structure of the instant arrangement, including the anti-binding feature provided by the bearing assembly **61** provided beyond the distal end **64** of lower track **22** of the first pair of tracks, the bearing assembly supporting the outside surface **76** of the lower track **26** of the second pair of tracks **24, 26**.

Additionally, the assembly **10** incorporates a disconnect feature for the solid bearing portion of the drawer slide. The disconnect feature includes lever **96** which permits the drawer to be removed from the cabinet and replaced therein.

Further, the illustrated construction provides a slide assembly which is very narrow between the side of the drawer and the supporting cabinet structure.

What is claimed is:

1. A slide assembly comprising a first track member providing a pair of first tracks, a second track member providing a pair of second tracks engaging the first tracks and a third pair of tracks, each of the first, second and third pairs of tracks including an upper track and a lower track, and the third track member providing a fourth pair of tracks, the first, second and third track members each having a proximal end and a distal end, the first track member being stationarily mounted on a cabinet and the third track member being stationarily mounted on a drawer extensible outwardly from, and retractible inwardly into, the cabinet, the first, second and third track members extending longitudinally of one another, the second track member being movable outwardly and inwardly longitudinally from the distal end of the first track member and the third track member being movable outwardly and inwardly longitudinally of the distal end of the second track member, the first and second track members being longitudinally slidably connected by engagement of respective tracks of the first and second pairs, and the second and third track members being longitudinally slidably connected by interpositioning between each track of the third pair and a respective track of the fourth pair a plurality of bearings, the first tracks being disposed on the first track member in facing relation, the second tracks being disposed on the second track member for engagement in the respective first tracks, the third tracks being mounted on the second track member in nested orientation to the second tracks and in oppositely facing relation to one another, and the fourth tracks being disposed in facing relation to lie between respective second and third tracks, the first track member including roller means for bearing weight of the extended second and third track members and drawer.

2. The apparatus of claim 1 wherein the roller means includes an axle mounted to project outwardly from a lower portion of the distal end of the first track member, a plurality of bearings surrounding the axle and a wheel retaining the bearings adjacent the axle and providing a smooth, continuous peripheral surface contacting a downwardly facing surface of the lower one of the second tracks.

3. A slide assembly comprising a first track member providing a pair of first tracks, a second track member providing a pair of second tracks engaging the first tracks and a third pair of tracks, each of the first, second and third pairs of tracks including an upper track and a lower track, and the third track member providing a fourth pair of tracks, the first, second and third track members each having a proximal end and a distal end, the first track member being stationarily mounted on a cabinet and the third track member being stationarily mounted on a drawer extensible outwardly from, and retractible inwardly into, the cabinet, the first, second and third track members extending longitudinally of one another, the second track member being movable outwardly and inwardly longitudinally from the distal end of the first track member and the third track member being movable outwardly and inwardly longitudinally of the distal end of the second track member, the first and second track members being longitudinally slidably connected by engagement of respective tracks of the first and second pairs, and the second and third track members being longitudinally slidably connected by interpositioning between each track of the third pair and a respective track of the fourth pair a plurality of bearings, the first tracks being disposed on the first track member in facing relation, the second tracks being disposed on the second track member for engagement in the respective first tracks, the third tracks being mounted on the second track member in nested orientation to the second tracks and in oppositely facing relation to one another, and the fourth tracks being disposed in facing relation to lie between respective second and third tracks, the first track member including means providing a disconnect lever adjacent its distal end, the disconnect lever including an engaging portion and each of the first and second track members including means providing a notch for engagement by the engaging portion.

4. The apparatus of claim 3 wherein the lever is spring-biased to urge the engaging portion into the notches.

5. The apparatus of claim 4 wherein the disconnect lever is disposed adjacent the upper tracks of the first and second pairs and the notches are formed in such upper tracks.

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